

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.:

Filing Date: February 8, 2001

Applicant: Hiroyuki Osakabe

Group Art Unit:

Examiner:

Title: Cooling Apparatus Boiling and Condensing Refrigerant

Attorney Docket: 4041J0229DVA

Hon. Commissioner of Patents and Trademarks
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Dear Sir:

Preliminary to examination of the above-identified application on its merits, please
amend the application as follows:

IN THE SPECIFICATION

This application is a divisional of prior application No. 09/333,151, filed June 14,
1999. Amend the specification by inserting before the first line the sentence:

--This is a division of United States patent application No.
09/333,151, filed June 14, 1999.--

IN THE CLAIMS

Please cancel Claims 1-60 and add new Claims 61-70 as follows:

61. (New) A cooling apparatus comprising:

a refrigerant tank for reserving a refrigerant to be boiled and vaporized by heat of a heating body;

a radiator for releasing heat of the refrigerant vaporized in said refrigerant tank to an external fluid;

a first boiling area increasing means disposed in said refrigerant tank, said first boiling area increasing means arranged at a lower side of said refrigerant tank for defining an inside of said refrigerant tank into a plurality of first vertically extending passages, and

a second boiling area increasing means disposed in said refrigerant tank, said second boiling area increasing means arranged at an upper side of said refrigerant tank for defining the inside of said refrigerant tank into a plurality of second vertically extending passages, wherein

said second boiling area increasing means horizontally offsets from said first boiling area increasing means for allowing said first vertically extending passages to communicate with said second vertically extending passages.

62. (New) A cooling apparatus according to Claim 61, wherein

said refrigerant tank is substantially vertically arranged, and

an average open area of said second vertically extending passages is larger than an average open area of said first vertically extending passages.

63. (New) A cooling apparatus according to Claim 61, wherein said first and second boiling area increasing means include corrugated fins to define said first and second vertically extending passages, respectively.

64. (New) A cooling apparatus according to Claim 63, wherein said corrugated fins have openings at side surfaces thereof.

65. (New) A cooling apparatus according to Claim 63, wherein said corrugated fins have louvers at side surfaces thereof.

66. (New) A cooling apparatus comprising:

- a refrigerant tank for reserving a refrigerant to be boiled and vaporized by heat of a heating body;
- a radiator for releasing heat of the refrigerant vaporized in said refrigerant tank to an external fluid;
- a first boiling area increasing means disposed in said refrigerant tank, said first boiling area increasing means arranged at a lower side of said refrigerant tank for defining an inside of said refrigerant tank into a plurality of first vertically extending passages, and

a second boiling area increasing means disposed in said refrigerant tank, said second boiling area increasing means arranged at an upper side of said refrigerant tank for defining the inside of said refrigerant tank into a plurality of second vertically extending passages, wherein

said first boiling area increasing means and said second boiling area increasing means are arranged to provide a space therebetween for allowing said first vertically extending passages to communicate with said second vertically extending passages.

67. (New) A cooling apparatus according to Claim 66, wherein said second boiling area increasing means horizontally offsets from said first boiling area increasing means.

68. (New) A cooling apparatus according to Claim 66, wherein

said refrigerant tank is substantially vertically arranged, and

an average open area of said second vertically extending passages is larger than an average open area of said first vertically extending passages.

69. (New) A cooling apparatus according to Claim 66, wherein said first and second boiling area increasing means include corrugated fins to define said first and second vertically extending passages, respectively.

70. (New) A cooling apparatus according to Claim 69, wherein said corrugated fins have openings at side surfaces thereof.

71. (New) A cooling apparatus according to Claim 69, wherein said corrugated fins have louvers at side surfaces thereof.

11. The cooling apparatus of claim 10, wherein the first fin is a corrugated fin, and the second fin is a flat fin.

REMARKS

Claims 61-71 are now pending in the present application. Applicants have added Claims 61-71 to more clearly recite certain aspects of the present invention. Basis for the amendments can be found throughout the specification, claims and drawings as originally filed.

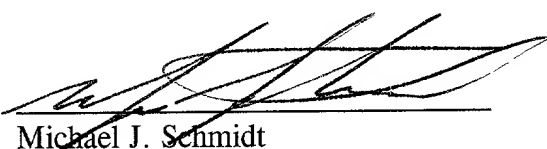
CONCLUSION

In light of the above amendments and remarks, Applicant would submit that all Claims are in a condition for allowance and thus Applicant requests that the Examiner pass the case to issue at his earliest possible convenience.

Should the Examiner have any questions regarding the present amendment he should not hesitate to contact the undersigned at (248) 641-1600.

Respectfully submitted,

Dated: FEB 8, 2001
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